BRIEFING

Floating hotels

How cruise ships are undertaxed despite their heavy environmental footprint and contribution to overtourism

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Summary

Cruising is booming. Over the past two decades, the cruise ship industry has expanded dramatically, with ships doubling both in size and in number, leading to a significant increase in their environmental footprint. In 2025, in the West European Mediterranean basin where most cruise ships sail, air pollution and greenhouse gas (GHG) emissions from cruise ships cost the community between €550 million and €930 million. When we include cruise operations along the Atlantic coastlines of these same countries, these external costs rise to between €790 million and €1.3 billion annually.

Regardless of their climate and environmental impact, cruises often remain largely outside the scope of standard regulatory and fiscal frameworks. They benefit from numerous exemptions or preferential regimes in areas such as Value Added Tax (VAT), energy taxation on fossil fuels, tourism levies, and tonnage taxes, resulting in a comparatively low tax contribution to national budgets.

Cruises are often seen as a symbol of mass and unsustainable tourism. They are perceived as contributing disproportionately to pollution while failing to pay their fair share of taxes. To put this into perspective, a night on board a cruise is taxed on average 40% less than a night in a hotel. This constitutes a major distortion of competition, given that cruise activity is much closer to tourist accommodation than to a mode of transport.

This has fuelled growing public opposition in many destinations. In response, an increasing number of port cities, regions, and national governments are considering or implementing measures to restrict cruise ship access or to introduce passenger-based levies, in line with the polluter pays principle.

x 3	**€790m – €1.3bn**	**€335m**
Increase of global cruise passengers in the last 20 years	Total external costs of the cruise ship sector in France, Italy and Spain in 2025	Combined yearly revenues for a €15 passenger tax in France, Italy and Spain

01 External costs of cruise ships

The unpaid environmental bill of the cruise ship industry

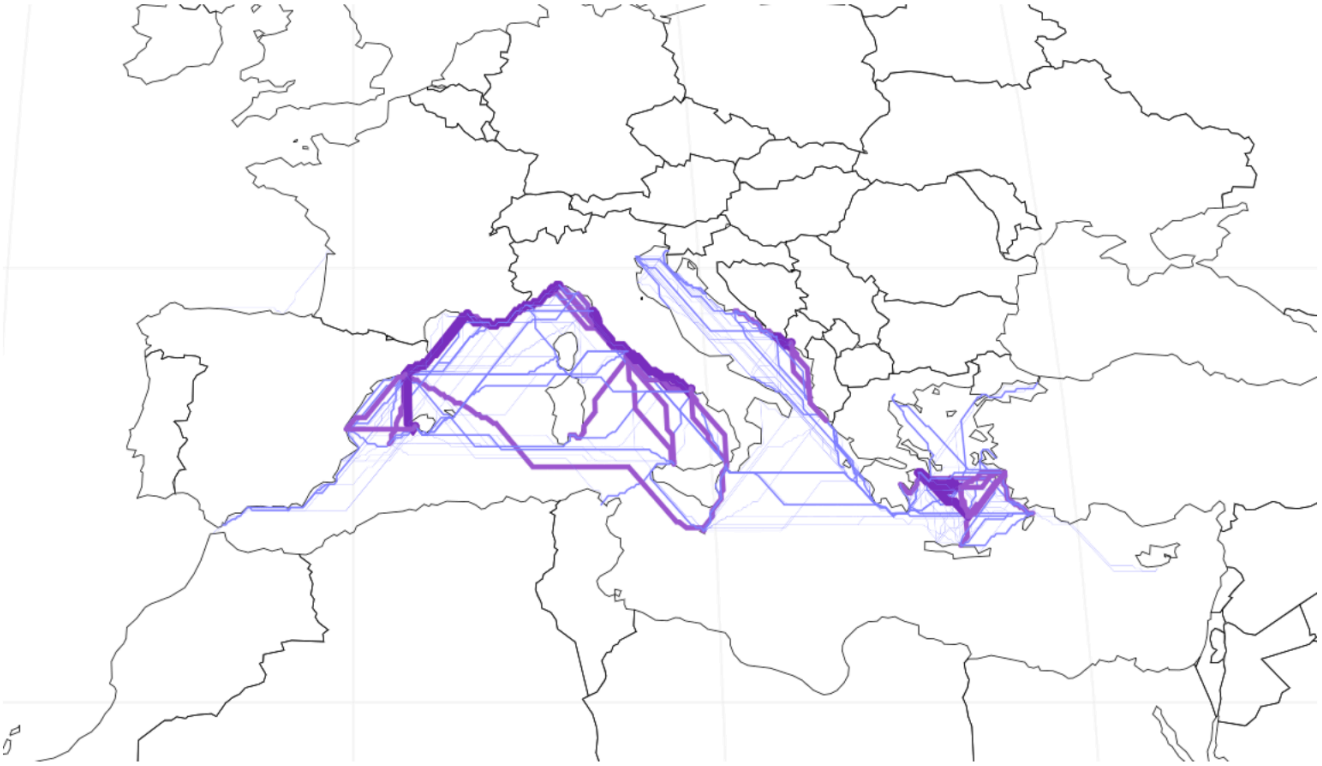
Cruise ships have become one of the most visible symbols of mass tourism in European port cities, imposing a staggering cost on the environment and on local communities. The cruise industry is responsible for the resulting public health and environmental impacts of their economic activity. Today, these costs—which reached a total of €790 million to €1.3 billion in France, Spain, and Italy combined in 2025—far exceed existing environmental tax revenues, particularly in areas of the Mediterranean basin.

1.1 The environmental impact of the cruise sector is significant

Cruises are sold as leisure tourism, but a significant part of their real cost is not paid through the ticket price (see details in Annex). Their greenhouse gas emissions (GHG) and air pollution impose costs on the climate, public health systems, coastal ecosystems and port communities. As cruise demand continues to boom, the industry's impacts are steadily rising alongside it. The Mediterranean is Europe's top cruise destination, capturing a major share of itineraries aimed at exploring the cultural and heritage wonders of Spain, Italy, and France. In 2025, 65% of cruise passengers in Europe sailed in the Mediterranean.

The Western Mediterranean is a hotspot of cruise activity

Busiest routes operating in the Mediterranean Sea



Source: T&E (2026) based on AIS data • Deeper colours indicates a higher number of voyages.

In this particular area, the level of impact can be perceived as overcoming the benefits of this economical activity. By way of an example, in the Balearic Islands, the accumulation of passengers in a short time can overload local transport, infrastructure, and public space.The phenomena of mass tourism has often led to local protests against cruise ships. Places such as Venice, Barcelona, Marseille, Dubrovnik and Santorini have become focal-points of the anti-cruising movement, where citizens and activists organized numerous demonstrations against large cruise ships.

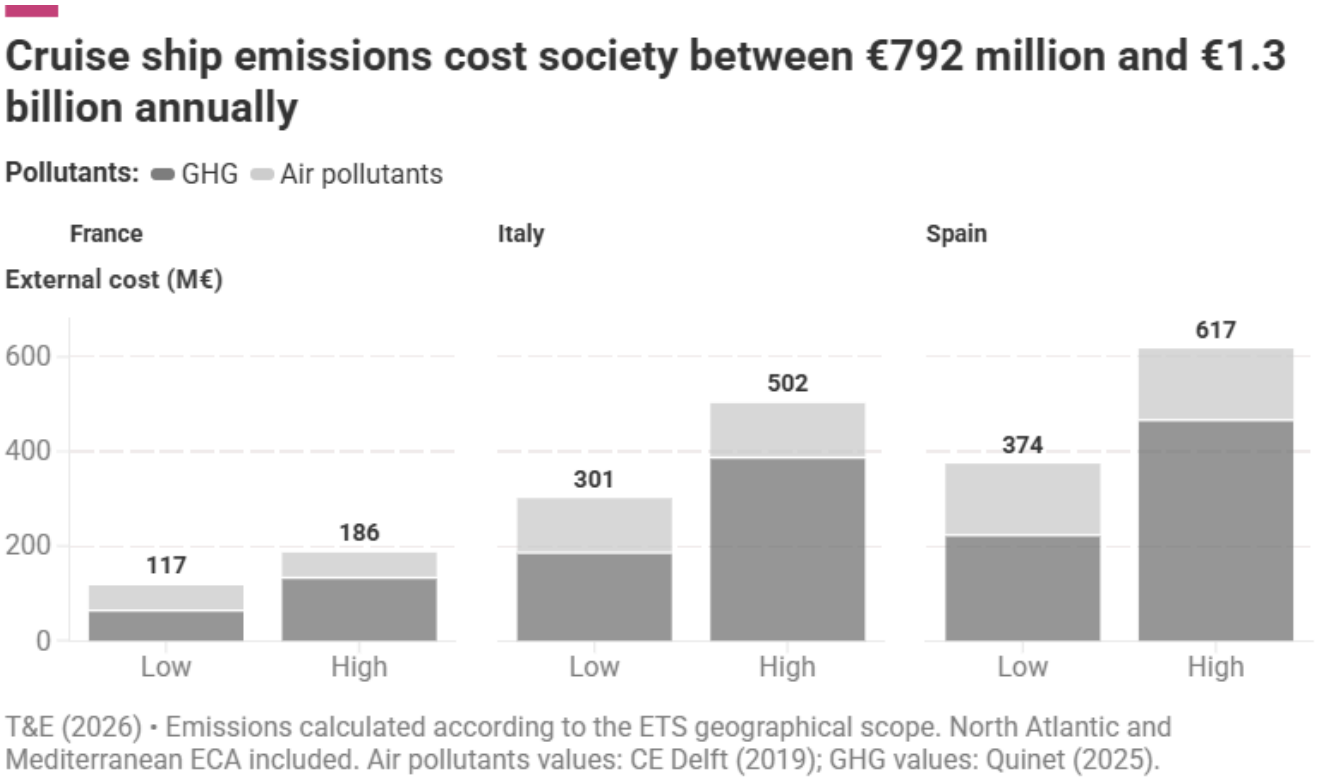
Among the environmental damages, the easiest to quantify are greenhouse gases (GHGs), including carbon dioxide [CO_2], methane [CH_4], and nitrous oxide [N_2O], as well as air pollutants such as nitrogen oxides [NO_x], sulfur oxides [SO_x], and particulate matter [PM]. The Mediterranean regions are particularly exposed, together France, Spain and Italy's cruise ships emitted 2.7 Mt CO_2e, 40.5 kt of NO_x, 5.5 kt of SO_x, 2.3 kt of PM2.5 and 2.5 kt of PM10 in 2025.

These pollutants have different impacts but all impose costs on society. GHGs contribute to climate change, while air pollutants contribute to respiratory and cardiovascular harm. The European Environment Agency identifies air pollution as the largest environmental health risk in Europe, with long-term exposure to fine particulate matter and nitrogen dioxide linked to major health impacts.

When the existing policies are not sufficient to tackle the environmental footprint of an economic activity, these costs are called negative externalities or external costs.

In the west Mediterranean basin alone - including France, Spain and Italy, **the external costs of cruise ships (GHG and air pollutants) reached between €557 million and €930 million in 2025.** When we include cruise operations along the Atlantic coastlines of these same countries, these external costs rise to between **€792 million and €1.3 billion annually**.

Indicator	Results
External costs in the Atlantic regions across Spain and France, including North Sea/Channel regions	€235m–€375m
External costs in the Mediterranean regions of France, Spain and Italy alone	€557m–€930m
Total across all regions	€792m–€1.3bn



T&E (2026) • Emissions calculated according to the ETS geographical scope. North Atlantic and Mediterranean ECA included. Air pollutants values: CE Delft (2019); GHG values: Quinet (2025).

Italy and Spain carry the largest absolute external costs in the assessment, reflecting their high cruise activity in the Mediterranean and, for Spain, the additional West Atlantic region. France's costs are lower in absolute terms but still significant, with impacts spread across the

Mediterranean, Atlantic and North Sea/Channel areas. As cruise activity in Europe continues to grow, these externalities are expected to increase further.

The distribution of costs also shows why cruise pollution is not only a climate problem. Depending on the climate valuation, air pollutants represent between 25 and 40% of the costs from cruise ship emissions, with the remainder costs coming from GHG emissions. This matters for policy design, even a strong carbon price would not address the full unpaid bill unless it is accompanied by measures targeting NO_x, SO_x and PM.

1.2 Existing policies are insufficient to cover the negative externalities of the cruise ship sector

Current green shipping regulations fail to adequately address the cruise industry's true footprint.

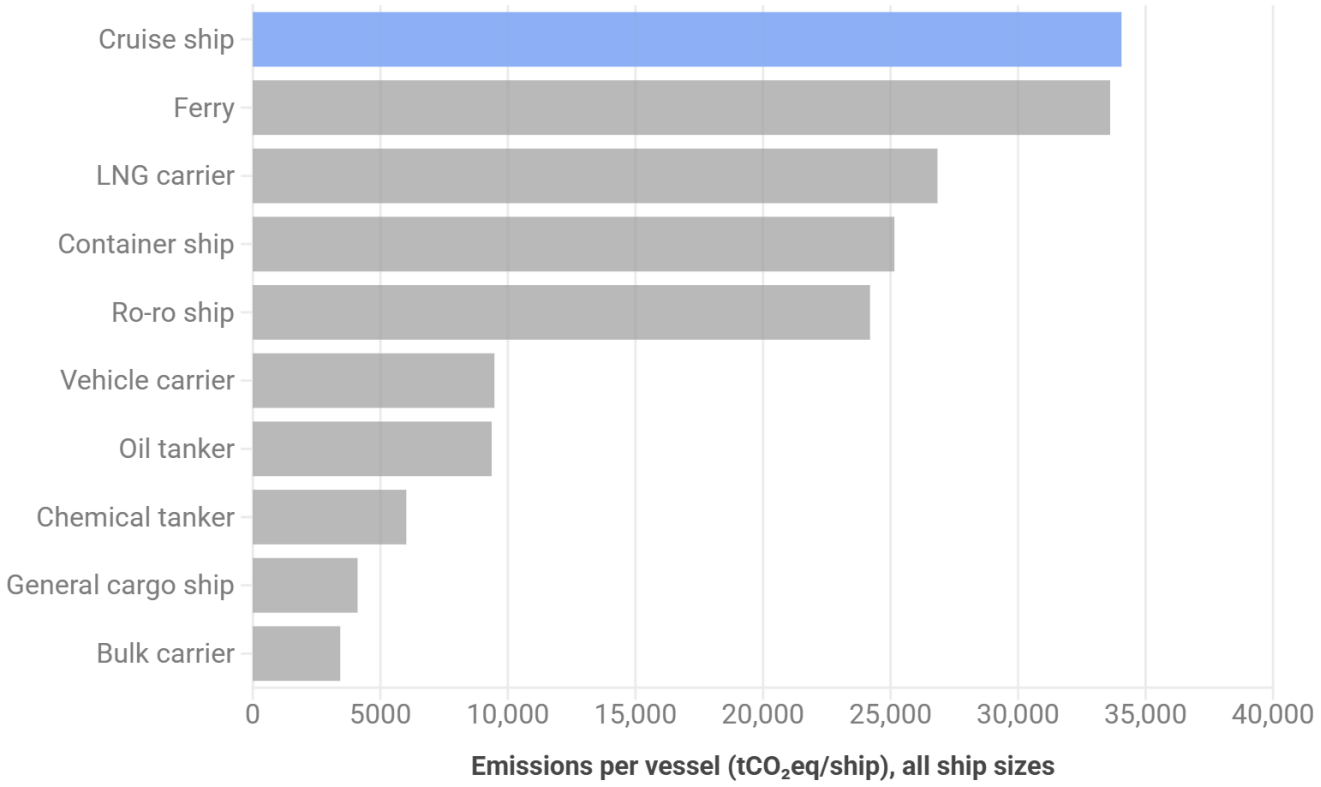
Key legislative measures, such as the EU's mandate to use onshore power supply (OPS) at berth from 2030 under the AFIR regulation, the integration of shipping into the EU Emissions Trading System (ETS), the gradual fuel transition under FuelEU Maritime, and the newly established Mediterranean Sulphur Emission Control Area (SECA), are step-by-step advancements towards full decarbonization by 2050.

However, as of today, climate and clean air regulation remain profoundly insufficient to fully internalise and cover the heavy negative externalities generated by the cruise sector.

The revenues generated by the EU ETS applied to cruise ships leave a significant gap in covering externalities. On average, the climate-related external costs of this sector exceed ETS revenues by a factor of two to three depending on the cost of carbon. For costs related to air pollution, there is no such tax existing at the EU level. The environmental and public health impacts of these giant floating resorts remain largely unmitigated due to their size. Additionally, their enormous power requirements - directly driven by their size - puts a substantial pressure on local electricity grids, leading to heavy infrastructure investments.

In absolute terms, cruise ships represent a minor fraction of global maritime traffic, accounting for just 1% of the world's fleet and less than 2% of EU shipping CO_2 emissions in 2024. Yet, on an individual basis, they are the single most carbon-intensive category of vessels afloat. One single cruise ship emits, on average, as much GHG in one year as 19,000 cars according to our calculations.

Cruise ships emit the most greenhouse gases per ship



Source: T&E analysis (2026), based on 2024 Thetis-MRV data

This massive footprint is driven by their scale and nature: these vessels are among the largest ships ever built, carrying thousands of passengers and requiring immense amounts of energy not just for propulsion, but to power energy-intensive amenities, hospitality services, and onboard entertainment.

The deployment of alternative-fuel engines in the cruise sector is a recent phenomenon. Among available options, only synthetic e-fuels offer genuine potential regarding deep emission reductions, sustainability, and scalability. Despite tightening EU decarbonisation targets, the industry remains heavily reliant on fossil fuels: out of the ten highest-emitting ships in the EU in 2024, four were cruise ships.

Currently, the global cruise fleet's transition away from fossil fuels is moving very slowly:

- 6% run on Liquefied Natural Gas (LNG)
- 0.3% on methanol
- 1% on hydrogen
- 3% on plug-in hybrid power

Consequently, roughly 90% of the cruise ship fleet still relies entirely on conventional, highly polluting marine fuels. This heavy lock-in to fossil fuels is structurally reinforced by the long operational lifespan of these vessels, which typically remain in service for several decades.

This makes cruises an exceptionally high-impact form of tourism, far exceeding the footprint of alternative holiday options. To better contextualise this impact, it is useful to compare cruise tourism with functionally similar sectors, in particular land-based accommodation such as hotels and resorts, rather than transport modes alone. To put this footprint into perspective, independent analysis by the International Council on Clean Transportation (ICCT) exposes the true scale of the industry's climate impact:

- A cruise passenger emits twice as much CO_2 as a tourist who flies to their destination and stays in a high-end hotel.
- A cruise passenger generates two to four times more CO_2 than holidaymakers taking a traditional road trip and staying in a hotel.

02 Taxation of cruise ships

End the cruise ship tax gap

Driven by global competition, the shipping industry has always enjoyed favourable tax treatment. However, cruise ships represent a completely different reality: they are primarily tourism and leisure destinations rather than transport services. A more appropriate benchmark is the land-based hospitality sector, with which cruise ships directly compete for tourists and holiday spending.

2.1 A serious tax gap between cruise ships and land-based resorts

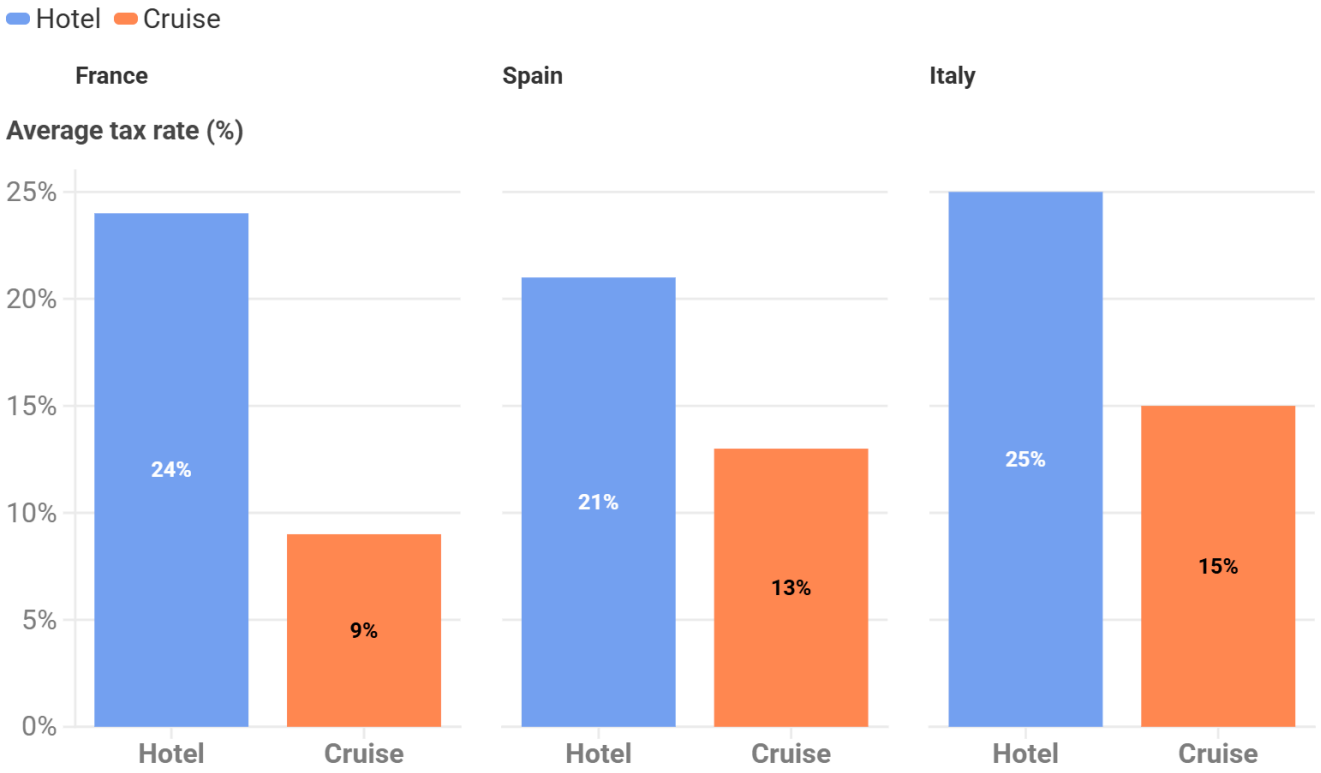
To establish a fair baseline, cruise ships must be compared with land-based resorts rather than commercial vessels.

Legally classified as passenger ships, cruise ships fall under regulations designed for maritime transport. Consequently, they benefit from the tax exemptions granted to commercial cargo fleets, including exemptions on corporate income tax, Value Added Tax (VAT) and marine fuel taxes. Historically, these preferential regimes have been justified by geopolitical constraints and intense international competition between shipowners, and the ability of shipowners to relocate vessels between jurisdictions through reflagging or calling at low-tax ports.

In reality, however, cruises represent a leisure activity that is entirely decoupled from global trade and free from the structural constraints of freight transport. Cruises are not merely a mode of transportation to a destination but the destination itself. Cruise passengers select their trips based on the destinations offered but also on onboard amenities such as swimming pools, dining options or entertainment.

A comparison analysis performed by T&E reveals a profound disparity between the taxation levels of cruise ships and land-based hotels. The data demonstrates that due to the structurally distinct tax regimes applied to maritime traffic versus onshore real estate, **cruises face a significantly lower tax burden than traditional hotels.**

Cruises are taxed much less than hotels



Source: T&E (2026) • Costs based on cruise ships operating on international voyages. Average daily cost assumed at €100/day for both options.

Tax burden as a percentage of overnight price (average for low-end cruises and hotels) :

23%	Of a one-night stay paid as taxes in a hotel
12%	Of a one-night stay paid as taxes on a cruise ship

When considering high-end cruises, the difference is even starker: cruises pay seven times less tax than hotels. In a high-end hotel, taxes account for 20% of the total overnight price. By contrast, taxes represent less than 3% of the ticket price for a night onboard a high-end cruise ship. This figure demonstrates that the wealthiest tourists, who can afford luxury vacations at sea, contribute a disproportionately low amount to public finances.

This regression occurs because the levies applied to international cruises are predominantly flat. Because these charges do not scale with the price of the ticket and therefore revenues, they represent a negligible fraction of the total revenue generated by premium and luxury cruise lines.

Breakdown of the cruise ship tax gap

The comparison analysis studied the structural discrepancies between cruise ships and land-based resorts across the following fiscal pillars:

- **Direct VAT :** A standard tax on general consumption. While hotels benefit from a reduced rate of 10% in the target countries, international cruise itineraries are entirely exempt from direct VAT.
- **Local taxes :** Levies used by municipalities to fund public infrastructure and services (e.g., property tax). Cruise ships do not pay any local property or municipal real estate taxes.
- **Port fees :** The "entrance ticket" paid by a vessel to utilize harbor infrastructure and services. Applicable to all commercial maritime traffic, the fee is split between one part charged for the ship using the berth, and one part based on the number of passengers.
- **Tourist tax :** A mandatory nightly contribution paid by tourists staying in commercial accommodations to local municipalities. While hotel guests pay a sliding-scale fee based on the resort's star rating, cruise passengers remain entirely outside the scope of these levies in most Mediterranean port cities.
- **Energy taxation :** Duties imposed on energy products based on fuel type. All commercial vessels, including cruise ships, are fully exempt from fuel taxes under the EU Energy Taxation Directive (ETD).
- **Carbon pricing :** Market-based instruments designed to internalize the external costs of GHG emissions. While some EU Member States feature carbon components within domestic fuel taxes, they are rarely applied to international shipping. The maritime sector was integrated into the EU Emissions Trading System (ETS) in 2024, representing a critical step forward. However, parallel carbon pricing mechanisms for the building sector (which would affect hotels) face ongoing legislative delays.
- **Corporate income tax :** An annual tax on corporate profits, averaging 21% among OECD States in 2025. While hotels face standard corporate tax rates, shipowners benefit from the "tonnage tax"—a regime allowing companies to pay tax based on the net tonnage (volume) of their fleet rather than actual corporate profits. Widely adopted

globally, this system ensures an exceptionally low effective corporate tax rate for cruise lines.

The high level of environmental and public health impacts of the cruise sector have sparked widespread community protests globally, particularly across Mediterranean port cities.

In response, several governments have introduced dedicated cruise ticket levies to address this fiscal loophole, while others have enacted stricter operational limits, including total bans or capacity caps in historic city centers.

2.2 Proposal for a national cruise ship passenger levy

As demonstrated in Section 1, existing market-based policies fail to cover the heavy external costs of cruise tourism, notably its GHG emissions and localized air pollution.

To rectify this market failure, targeted fiscal instruments must be introduced. Implementing a dedicated levy on cruise tickets would internalize the sector's negative externalities and ensure a robust application of the "polluter pays" principle.

Such a mechanism would generate hundreds of millions of euros in recurring public revenues, which could be used by general national budgets or directly earmarked to accelerate the maritime energy transition or protect vulnerable coastal ecosystems and biodiversity.

2.2.1 Designing an effective national cruise levy

Local and national governments worldwide are increasingly adopting cruise ship levies. These pioneering jurisdictions generally fall into two categories:

- **Highly frequented markets in the Mediterranean and the Caribbean** (e.g., Spain, Greece, Mexico, Croatia, and The Bahamas) reacting to intense local backlash against overtourism.
- **Nature-based markets :** Vulnerable or remote regions whose reception infrastructure cannot sustainably absorb mega-cruise ships (e.g., Iceland, Norway, Scotland).

A flat-rate passenger tax represents the most transparent and straightforward mechanism for a cruise levy.

In most jurisdictions, this takes the form of a "day-tripper tax" assessed at the port of call, calculated dynamically based on the exact number of passengers onboard or disembarking. Alternatively, the levy can be structured using different ranges based on the vessel's total passenger capacity. Furthermore, several countries apply the tax across all operational phases, no matter whether the vessel is at berth, anchored offshore, or transiting through territorial waters.

A phased implementation timeline or a time-limited transitional framework could also be deployed. For instance, Mexico adopted a multi-year scale that applies a flat €4.5 tax per night per passenger starting August 1st, 2025, rising incrementally to €18.5 as of August 1st, 2028.

In the EU, a national levy could function as a temporary measure until the broader EU legislative framework becomes sufficiently stringent and effective. This levy would bridge the gap until EU ETS carbon prices fully internalize the cost of CO_2 emissions, onshore power supply (OPS) becomes legally mandatory for all port calls, and FuelEU GHG reduction targets require switching to green fuels. Beyond the EU framework, the International Maritime Organization (IMO) could expand Emission Control Areas (ECAs) to comprehensively regulate not only SO_x emissions, but also NO_x and particulate matter. The use of exhaust gas cleaning systems (i.e. scrubbers), as an option to comply with air quality standards should also be banned under international, regional, or national frameworks.

Existing global cruise taxes typically range from a few euros to over €20 per passenger. Notable examples include:

- **State/national level** : Mexico (rising from €4.5 today to €18.5 by 2028); Greece (€5–€20 during peak summer months, with discounted rates off-season), Iceland (€2-€11/day); Norway (€9 starting in 2027) and the Caribbean (ranging from a low €1.3 in the Dominican Republic to a much higher fee of €20-€26 in The Bahamas).
- **Regional or local level** : Catalonia (€4–€6, supplemented by a €5 city surcharge in Barcelona, which currently discusses a possible increase of the tax to €24 for cruise ships staying at berth for less than 12 hours); Lisbon (€2); Amsterdam (€15); the Balearic Islands (€2); Alaska (€30.5); Genoa (€3); Civitavecchia and Scotland (under discussion).

T&E has modeled the impact of a standard €15 levy per disembarking passenger across France, Italy, and Spain. This figure sits within the mid-to-high range of current European benchmarks.

In terms of passenger optics, a €15 charge is virtually negligible compared to standard onboard upsells, such as premium Wi-Fi packages, averaging around €20 per day.

Such a measure could raise hundreds of millions of euros in yearly revenues.

€145m	in Italy
€134m	in Spain

€55m in France

In order to ensure a fair and effective tax model, the design of the levy could incorporate targeted exemption regimes and explicitly earmark revenues toward environmental mitigation.

Revenue earmarking and regulatory exemptions

Earmarking of revenues

A cruise passenger levy captures sustainable revenue from a highly profitable, thriving tourism sector. These funds could be earmarked for coastal preservation, port decarbonization, and maritime heritage:

- **Protection of ecosystems in coastal areas:** funding public conservation bodies or programs dedicated to coastal ecosystems.
- **Green infrastructure:** financing the capital expenditure required to install Onshore Power Supply (OPS/cold-ironing) infrastructure in cruise-heavy ports.
- **Decarbonization R&D:** Direct subsidies for zero-emission shipping innovations and synthetic fuel development.

Targeted exemptions and rate differentiation

Policy designs can introduce structural variations to incentivize greener operations and protect equity:

- **Itinerary duration:** Higher tax rates for short-stay or multi-call itineraries to curb high-frequency port congestion.
- **Age exemptions**: Full exemptions for children
- **Cabin categories:** Sliding-scale rates based on cabin category, ensuring luxury suites bear a higher tax burden.
- **Geographical sensitivity:** Dynamic rates that increase for environmentally sensitive island ecosystems or cities suffering from severe overtourism.
- **Seasonal calibration:** Peak-season surcharges (e.g., summer months) to help smooth out tourist flows throughout the year.

2.2.2 A cruise passenger levy will not detrimentally affect local tourism

Because many modern cruise levies have been adopted recently, long-term empirical data on passenger elasticity remains limited. However, historical performance suggests that existing global levies have had zero negative impact on overall passenger volumes.

In the case of Barcelona, the city quadrupled its local cruise tax over a ten-year period, yet experienced a 30% increase in cruise tourist arrivals during that exact timeframe. Similarly, Greece recorded an 11% surge in total visitor numbers within a single year, even with its nationwide cruise levies fully active. In the Caribbean, the market leaders in cruise volumes—Mexico and the Bahamas—are the nations that impose the highest baseline cruise fees.

A formal impact assessment by the Scottish Government corroborates this resilience, noting the following trends:

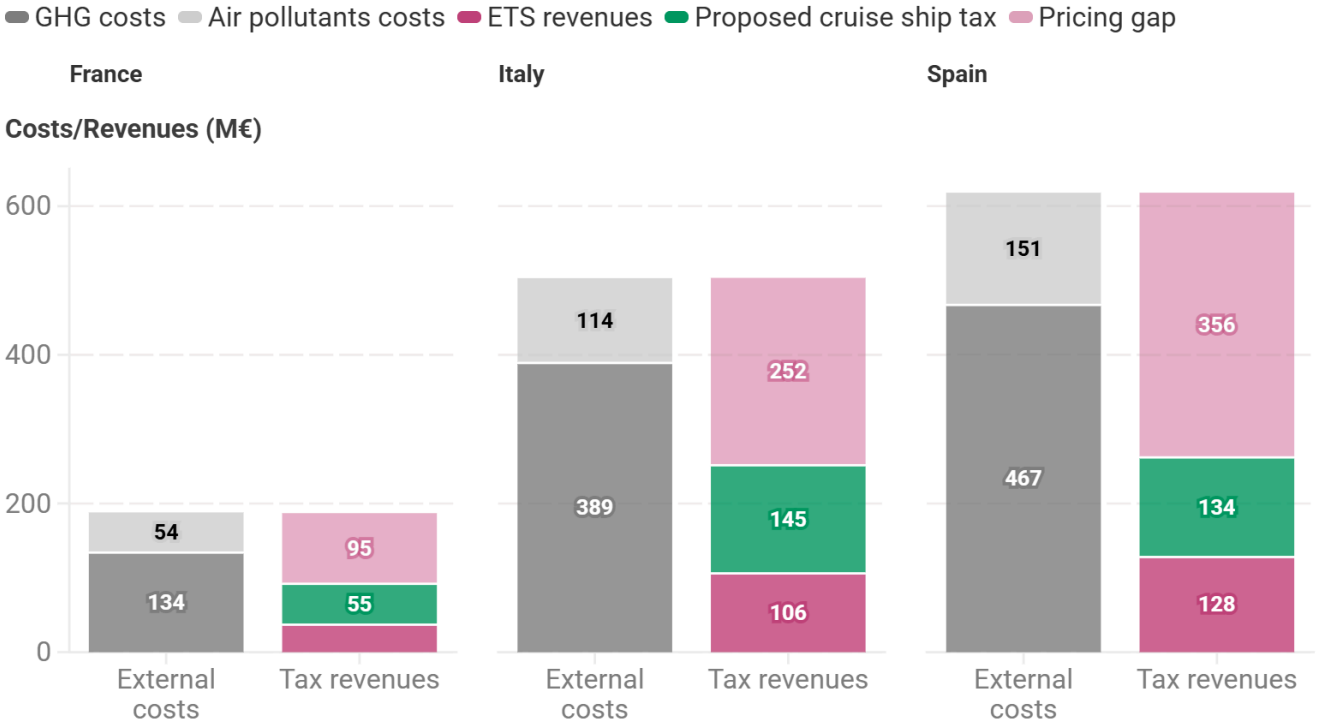
- **Short-notice implementation**: When taxes were introduced at short notice (e.g. announced and implemented within two months, as in Amsterdam), their introduction caused only a temporary reduction in the number of cruise ship calls.
- **Long-term recovery:** Once the tax had been in force for some time, the number of port calls returned to its previous levels and, in some cases, continued to rise.
- **Advanced notification:** Where taxes were introduced well in advance (e.g. a two-year advance notice in Dubrovnik), the impact on the number of cruise ship port calls was marginal.

Ultimately, a cruise passenger tax is an essential economic tool designed to internalize the hidden costs of the sector into the ticket price. However, price signals alone cannot solve the physical challenges of overtourism as the cruise ship industry continues to grow.

2.2.3 A tax alone fails at bridging the gap of the external costs of cruise ship

While a €15 passenger levy generates vital revenue, it remains insufficient on its own to offset the total environmental costs of the cruise sector. Indeed, the revenues of a cruise ship levy combined with the revenues generated by the ETS mechanism would still be insufficient to cover the negative externalities caused by the cruise ship sector.

A €15 port tax per passenger is not enough to offset the impact of the cruise industry



T&E (2026) • Emissions calculated based on the ETS scope. Proposed cruise tax of €15/pax. Air pollution costs from CE Delft (2019), GHG costs from Quinet (2025). North Atlantic and Mediterranean ECA included.

Thus, a cruise ship levy must be viewed as part of a broader regulatory mix.

To fully mitigate the sector's environmental footprint, parallel supply-side policies are necessary, including strengthening EU regulations on sustainable marine fuels (FuelEU Maritime) and tightening energy efficiency benchmarks (slow steaming, wind propulsion, electrification and onboard efficiency technologies). To drive industry leadership, cruise ships should face more stringent environmental performance standards than standard commercial cargo vessels.

If the primary objective of local and national policymakers is to systematically reduce localized environmental degradation and crowding, economic instruments must be coupled with strict operational caps.

Several pioneering European destinations have already deployed successful non-fiscal caps to stabilize visitor flows:

- **Daily and annual passenger caps:** Dubrovnik (Croatia) and the Alpes-Maritimes region (France) enforced hard ceilings on the total number of cruise passengers permitted to disembark per day or per calendar year.
- **Vessel slot constraints:** Ports like La Rochelle (France) and Barcelona (Spain) have established strict caps on the absolute number of cruise ship port calls per year or cruise terminals in the city.

- **Zoning and terminal relocation:** Cities including Barcelona (Spain), Bordeaux (France), Venice (Italy), and Amsterdam (The Netherlands) have decided to restrict or ban mega-cruise vessels from entering their historic city centers, relocating terminals to peripheral industrial zones.
- **Mandatory minimum berthing times:** To eliminate rapid, high-turnover day-trips and lower peak passenger spikes, jurisdictions have mandated extended stays. In Dubrovnik (Croatia), vessels must remain docked for a minimum of eight hours, extending to twelve hours for mega-ships carrying more than 4,000 passengers.

Recommendations at EU level

01 Reform the EU VAT Directive to specifically eliminate VAT exemptions for "international cruise voyages" and align cruise ship VAT with land-based tourism

02 In the revision of the Energy Taxation Directive, exclude cruise vessels operating in EU waters from full marine fuel tax exemptions

03 Adopt an EU obligation establishing minimum environmental levies on cruise operators to reflect the external costs of cruise tourism

04 Tighten decarbonisation rules for cruise ships, including stronger FuelEU Maritime GHG targets and extending AFIR so cruise ships must use shore power or zero-emission alternatives at berth to avoid overloading electricity grids.

05 Mandate speed reduction for cruise ships in EU waters

06 Ban the use of scrubbers in all European waters

Recommendations at national level

01 Establish a national levy aimed at internalizing the environmental externalities associated with cruise operations (more or less €15 per passenger / port call)

02 Earmark all tax revenues to accelerate the rollout of port OPS infrastructure and to support the conservation and restoration of marine and coastal ecosystems

03 Restrict cruise traffic in overtourism hotspots through daily passenger caps, vessel berth limitations, and bans from historic city centers or sensitive marine areas

04 Encourage voluntary, sector-led initiatives to improve environmental performance (e.g. Mediterranean sustainable cruise ship charter)

Annex I: Further information

Definition of negative externalities

Negative externalities, or external costs, refer to "*the* ***difference between social costs*** *(i.e. all costs to society due to the provision and use of transport infrastructure)* ***and private costs of transport*** *(i.e. the costs directly borne by the transport user)." - CE Delft (2019)*

In the case of cruise ships, the emissions of GHG and air pollutants are the most significant external costs and the easiest to quantify. GHG emissions impose wide social costs through the various consequences of global warming that are not entirely integrated in the current carbon pricing system. Air pollutant emissions have biodiversity and human health impacts that are not currently priced in the costs of cruises.

Cruise ships can also be responsible for other types of negative externalities such as congestion, damage to coastal areas, etc.

Overview of Emission Control Areas (ECAs)

Air pollution in the Mediterranean: the limits of the new ECA zone

While the official entry into force of the Mediterranean Sea Emission Control Area (SECA) on May 1, 2025, represents a significant step forward, air pollution from shipping across the basin remains critical due to major regulatory loopholes. The current framework suffers from two main shortcomings:

- **A narrow pollutant scope**: structurally, the Mediterranean SECA is exclusively a Sulphur Oxides (SO_x) and Particulate Matter (PM) control zone; it excludes Nitrogen Oxides (NO_x) regulations, allowing vessels to continue emitting unmitigated volumes of smog-forming gases near densely populated coasts.
- **Highly permissive emission thresholds compared to other transport sectors**: this new cap of 0.1% of SO_x is 100 times higher when compared to standards for road vehicles.

Comparison of air pollutants thresholds across transport sectors

European road transport (Since 2009)	SO_x, NO_x, PM, CO	0.001% (10 ppm)
Mediterranean ECA Zone (Since May 2025)	SO_x, PM, (NO_x excluded)	0.10% (1000 ppm)

To avoid buying expensive low-sulphur fuels (e.g. MDO/MGO), some cruise lines choose to install **Exhaust Gas Cleaning Systems (scrubbers)**. This allows them to continue burning

cheap, heavy fuel oil (HFO) with up to 3.5% sulphur content (35,000 ppm) while washing the sulfur out of the exhaust air. In "open-loop" configurations, this acidic, chemical-laden washwater is discharged straight into the Mediterranean Sea, transforming an air pollution issue into damage to marine biodiversity. This chemical pollution is devastating marine organisms—including microalgae and phytoplankton—as well as invertebrates like blue mussels and sea urchins.

Other ECAs applying in Spain and France

In Europe, other ECAs apply in the seas covered by the briefing:

- **North Sea ECA**: SO_X and PM since 2007, NO_x since 2021
- **North-East Atlantic ECA**: SO_X, PM and NO_x from 01/09/2027

Annex II: Methodology

Description of methodology

This briefing quantifies the external (social) costs of cruise-ship activity in Spain, Italy and France and their associated sea regions (Mediterranean, West Atlantic, North Sea/Channel), covering climate change and air pollution. The calculation has four steps:

1. **Emissions inventory**. We calculated activity-based emissions of CO_2, CH_4, N_2O, PM10, PM2.5, SO_x and NO_x by country and region. We used a bottom-up approach inspired from the Fourth IMO GHG study to calculate emissions: we used AIS data to define voyages and estimate energy demand on a voyage-basis. We derived fuel consumption from ship energy demand. We assumed vessels use the main fuel associated with them in the Clarksons World Fleet Register (WFR) database. In estimating emissions, we assumed that vessels equipped with dual-fuel LNG engines were running exclusively on LNG since we lack data to determine the exact fuel mix used onboard. Other vessels were assumed to run on HFO, VLSFO or MGO, depending on the relevant fuel sulphur standards in place in a given geographical area. Specifically:

- Ships in SECAs are required to use fuel with at most 0.1% sulphur content or rely on exhaust gas cleaning systems, i.e. scrubbers, to respect SO_X standards.
- Ships at berth or at anchor within the boundaries of European ports must follow this same rule for port stays above two hours.
- Ships sailing outside SECAs are required to use residual fuels complying to a maximum 0.5% sulphur content mandated under both EU Sulphur Directive and global MARPOL Annex VI.

We used Clarksons' WFR to identify ships equipped with scrubbers and assumed they were using 2.6% sulphur (2.6% S) HFO, with scrubber treatment of exhaust gases when needing to comply

with 0.1% sulphur standards. To calculate the resulting emission changes, we used the relative emission change after scrubber using HFO (2.6% S) compared with MGO (0.1% S), from the ICCT's 2020 scrubbers study, shown in the table below. In the absence of data we assumed CH_4 and N_2O emissions didn't change. In ports where the use of open-loop scrubbers is forbidden, we assumed 0.1% MGO is used instead.

CO_2	SO_x	NO_x	$PM_{2.5}$
+4%	-52%	0%	+61%

For this study, the most recent AIS data we had access to is from 2024. However, we modelled emissions assuming that both the Mediterranean and North Atlantic SECAs had entered into force, to give a long-term view of emissions.

Based on proximity to ports, speed of the vessel, duration spent close to ports, AIS statuses, and ship types, we identify port calls for vessels. A voyage is then defined as the time spent sailing from one port to another. We attribute emissions per region based on ports of arrival and departure: 50% of emissions of a voyage are attributed to the region of the departing port, and 50% to the region of the arriving port. For port calls, 100% of emissions are attributed to the region the port belongs to. Due to lack of data, we did not model the use of shore-side electricity during port calls. Port emissions represent only 10% of yearly cruise emissions on average according to our calculations, and not all energy demand can be serviced via shore power connections. In consequence, results are unlikely to be strongly affected.

Total emissions are detailed in the table below:

Indicator	Results
Total **GHG** emissions assessed, of which: Atlantic and North Sea Mediterranean	3.7 Mt CO_2e 1 Mt CO_2e 2.7 M tCO_2e
Total **NO_x** emissions assessed, of which: Atlantic and North Sea Mediterranean	56 kt 15.5 kt 40.5 kt
Total **SO_x** emissions assessed, of which: Atlantic and North Sea Mediterranean	7.5 kt 2 kt 5.5 kt
Total **PM** emissions assessed, of which: Atlantic and North Sea Mediterranean	6.4 kt 1.7 kt 4.7 kt

2. Conversion of GHG to CO_2-equivalent. CH_4 and N_2O are converted to CO_2e using the 100-year Global Warming Potentials set out in Annex I of Regulation (EU) 2018/1999 (as supplemented by Commission Delegated Regulation (EU) 2020/1044): CO_2 = 1, CH_4 = 28, N_2O = 265.

3. Application of unit external-cost values. Each pollutant's emissions are multiplied by a damage or avoidance cost per kilogram, then summed across pollutants, regions and countries. For climate change, two alternative carbon values are used to bracket the result, and these define the sensitivity analysis:

- CE Delft (2019) — the central, short-and-medium-run (up to 2030) avoidance cost from the *Handbook on the external costs of transport*: €100/tCO_2e in 2016€, restated to **€128.4/tCO_2e** in 2025€.
- Quinet (2025) — the "maximal profitable" carbon value from *La valeur de l'action pour le climat* (France Stratégie): the 2025 figure of €256/tCO_2e in 2023€, restated to **€267.6/tCO_2e** in 2025€.

For air pollution, region- and pollutant-specific average damage costs from CE Delft (2019), are used. These cover all effects — health impacts, crop losses, biodiversity loss and material damage. The unit costs applied to the three regions present in the analysis are:

Region	PM10 (€/kg)	PM2.5 (€/kg)	SO_x (€/kg)	NO_x (€/kg)
Mediterranean	17.98	31.59	11.81	3.85
Atlantic	5.26	9.25	4.49	4.88
North Sea	25.30	44.17	13.48	13.74

4. Restatement to 2025 euros. All cost factors are expressed in 2025 euros, using the Euro-area Harmonised Index of Consumer Prices (HICP) series from the ECB Data Portal

Breakdown of tax rate calculations

The study focuses on the following parameters to calculate the tax rate of one night spent in a hotel and in a cruise ship:

- **Taxes scope :** This analysis isolates the specific levies that diverge between hotels and cruise ships, including direct VAT, local property taxes, port fees, tourist taxes, energy taxation, carbon pricing, and corporate income tax.
- **International versus domestic itineraries :** Taxation structures vary depending on whether a vessel operates domestically or internationally. Because the most popular Mediterranean itineraries cross multiple borders, this analysis assumes cruise ships qualify for "international transport" status under most national tax regimes (for purely domestic cruises, the tax disparity is narrower, particularly regarding VAT). In fact, 99% of voyages made by the three main cruise corporations in the Mediterranean (Carnival Corporation,

MSC Cruises and Norwegian Cruise Line) are international according to T&E calculations based on AIS data.

- **Price range :** To capture the full spectrum of the market, the modeling contrasts a standard price range (€100 per person, per night, representing the average baseline cruise fare) against a luxury price range (€500 per person, per night, representing high-end cruise packages).
- **Geographical scope :** The Mediterranean remains Europe's primary cruise hotspot. To calculate representative tax rates, this study averages data from iconic port cities frequently exposed to cruise tourism along the Mediterranean coastlines of :

France	Spain	Italy
Marseille	Barcelona	Venice
Cannes	Valencia	Genoa
Ajaccio	Palma de Mallorca	Naples

Taxes included in the study

- **VAT**: We used the Taxes in Europe Database to calculate tax rates for cruise ship and hotel night stays, as well as for fuel, gas and electricity costs.
- **Local taxes**: We used various national and regional sources to calculate local taxes levied on hotels and cruises. These include local business taxes, real estate taxes and tourist taxes.
- **Taxes on energy**: States levy taxes on energy as well. These are included when applicable to the price of electricity and gas. Energy used per hotel room is estimated using the Hotel Sustainability Benchmarking Index.
- **ETS costs**: Cruise ships pay the ETS directly, while hotels pay it indirectly via their energy providers. GHG emissions from cruise ships are estimated by T&E through our in-house model, using the ICAP-reported average ETS price for 2025 (the latest available yearly average). We assume 100% of cruise GHG emissions are covered, since this is the expected steady-state coverage for the maritime sector within the ETS. For hotels, emissions per room using the Hotel Sustainability Benchmarking Index. We use national sources on the taxation of GHG emissions to estimate the cost component of GHG pricing in overall energy costs.
- **Corporate taxes**: Corporate taxes are calculated using the average of values found in the annual reports of large representative companies of their respective sectors

- **Port fees**: We used local sources for each port studied to define a representative rate per pax, averaged across all ports of the same country.
- **Tourist taxes**: We used local sources for each port studied to find whether the municipality levied a tourist tax on transit passengers.

Other calculations

- **Passenger tax**: We use the latest available Eurostat data from 2024 on passenger traffic to estimate the tax base for a passenger tax. We then multiply the number of passengers in excursion for each country by the tax rate of 15 €/pax. Expanding the tax to encompass all passengers onboard during a port call—including those who choose to remain on the vessel—would generate higher revenues, but was not modelled.
- **Average emissions per cruise ship**: We calculated average yearly emissions per cruise ship based on the latest available 2024 iteration of the MRV, taking the arithmetic average of overall GHG emissions for all cruise ships listed.
- **Number of cars equivalent**: We retrieved total car GHG emissions in 2024 from the EEA inventory. The number of cars in 2024 is taken from ACEA's report. We then derive a yearly figure for GHG emissions per car, and then use this ratio to calculate the number of cars required to match the average cruise ship's emissions.
- **Alternative fuel breakdown**: We calculated the share of ships running on fuels other than fuel oils based on data from Clarksons' World Fleet Register.

Annex III: References

France Stratégie. (2025). La valeur de l'action pour le climat : une référence pour évaluer et agir (Rapport de la commission présidée par A. Quinet). Haut-commissariat à la Stratégie et au Plan.

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